Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

a piston channel for communication of infusion medium received by the inlet;

a coil surrounding the piston channel;

a piston located within the piston channel and moveable axially within the piston channel to drive infusion medium into the piston channel; and

an armature disposed adjacent the coil, on one side of the piston channel, the armature having a pair of pole surfaces and also having radial struts for conducting electromagnetic flux between the pole surfaces in a radial direction;

wherein a clearance between the piston and the piston channel causes a volume of the infusion medium for refilling the piston channel to be greater than a volume of the infusion medium backflowing through the piston channel.

2. (Original) A drive mechanism as recited in claim 1, further comprising a coil cup composed of a magnetizable material, the coil cup having:

a generally annular inner wall;

a generally annular outer wall;

a generally annular interior between the inner and outer walls, the annular interior containing the coil; and

a piston channel surrounded by the inner wall, the piston channel of the coil cup being substantially coaxial with the coil;

wherein the inner wall has one end defining an inner pole surface and the outer wall has a second end defining an outer pole surface, the inner and outer pole surfaces acting with the armature to provide an electromagnetic flux path upon electrical activation of the coil.

3. (Previously Presented) A drive mechanism as recited in claim 2, further comprising a housing having a generally annular cavity containing the coil cup, the housing further having a central channel defining the piston channel.

4. (Original) A drive mechanism as recited in claim 3, wherein the housing is open on one side to the generally annular cavity and has a further cavity disposed on the opposite side, the further cavity defining the outlet chamber.

5. (Original) A drive mechanism as recited in claim 3, wherein the coil cup is secured to the housing by a friction fit of the coil cup within the generally annular cavity of the housing.

6. (Original) A drive mechanism as recited in claim 1, further comprising means for urging the armature and piston to move in an axial direction away from the outlet chamber.

7. (Original) A drive mechanism as recited in claim 6, wherein the means for urging comprises a spring.

8. (Withdrawn) A drive mechanism as recited in claim 6, wherein the means for urging comprises a magnet.

9. (Previously Presented) A drive mechanism as recited in claim 2, further comprising:

a housing having an interior cavity containing the coil cup, the housing further having a central channel defining the piston channel, the housing being open on one side to the interior cavity; and

a cover member disposed over the open side of the housing, the cover member defining an interior volume in which the armature is moveably disposed;

wherein said inlet is in flow communication with the interior volume of the cover member.

10. (Original) A drive mechanism as recited in claim 9, further comprising means for urging the armature in an axial direction toward the cover member toward a retracted position, wherein the cover member includes at least one stop surface for contacting the armature in the retracted position.

11. (Original) A drive mechanism as recited in claim 10, wherein the means for urging comprises a spring.

12. (Withdrawn) A drive mechanism as recited in claim 10, wherein the means for urging comprises a magnet disposed within the cover member.

13. (Original) A drive mechanism as recited in claim 1, further comprising a valve member moveable between open and closed positions to selectively allow and inhibit fluid flow between the inlet and the outlet, the valve member being moveable in response to axial movement of the piston within the piston channel.

14. (Original) A drive mechanism as recited in claim 1, further comprising a valve member moveable between open and closed positions to selectively open and close one end of the piston channel to the outlet chamber, the valve member being moveable in response to axial movement of the piston within the piston channel.

15. (Original) A drive mechanism as recited in claim 14, wherein the piston is moveable in the axial direction of the channel between a retracted position and a forward position, wherein the valve member is located in the closed position when the piston is in the retracted position and wherein the valve member is moved to the open position when the piston is moved to the forward position.

16. (Original) A drive mechanism as recited in claim 14, wherein the piston is moveable in the axial direction of the piston channel between a retracted position and a forward position such that, upon the piston being in the retracted position, a volume is defined between the piston and the valve member for receiving infusion medium through the piston channel and, upon the piston thereafter being moved toward the forward position, the volume between the piston and the valve member decreases to increase infusion medium pressure within the volume, force the valve member to the open position and discharge infusion medium into the outlet chamber.

17. (Original) A drive mechanism as recited in claim 1, further comprising a housing containing the coil and the outlet chamber, the housing having at least one fluid flow damping means or accumulator disposed in a flow path between the outlet chamber and the outlet, for reducing flow pressure variations.

18. (Original) A drive mechanism as recited in claim 17, wherein said at least one damping means comprises at least one compressible member disposed within the flow path.

19. (Original) A drive mechanism as recited in claim 17, wherein said at least one damping means comprises at least one chamber containing at least one compressible pillow.

20. (Original) A drive mechanism as recited in claim 17, wherein said at least one damping means comprises a plurality of chambers, each containing at least one compressible pillow.

21. (Original) A drive mechanism as recited in claim 1, further comprising:

a valve member moveable between open and closed positions to selectively open and close one end of the piston channel to the outlet chamber; and

a valve spring for urging the valve member in the closed position;

wherein the valve member and valve spring are located within the outlet chamber.

22. (Previously Presented) A drive mechanism as recited in claim 2, further comprising:

a housing having a cavity containing the coil cup, the housing having a central channel that defines the piston channel, the housing having a further cavity disposed on one end of the piston channel, wherein the further cavity defines the outlet chamber;

a valve member moveable between open and closed positions to selectively open and close one end of the piston channel to the outlet chamber; and

a valve spring for urging the valve member in the closed position;

wherein the valve member and valve spring are located within the further cavity defining the outlet chamber.

23. (Original) A drive mechanism as recited in claim 1, wherein the piston and armature are composed of a single, unitary structure.

24. (Withdrawn) A drive mechanism as recited in claim 1, wherein the piston and armature are composed of separable structures and are moveable independent of each other.

25. (Withdrawn) A drive mechanism as recited in claim 23, wherein the piston has two ends spaced apart in the axial direction and a flow passage extending in the axial direction from one end of the piston to the other end of the piston.

26. (Withdrawn) A drive mechanism as recited in claim 1, further comprising:

a valve member moveable between open and closed positions to selectively open and close one end of the piston channel to the outlet chamber, the valve member being moveable in response to axial movement of the piston within the piston channel;

wherein the piston has two ends spaced apart in the axial direction and a flow passage extending in the axial direction from one end of the piston to the other end of the piston; and

wherein the piston is moveable in the axial direction of the channel between a retracted position and a forward position such that, upon the piston being in the retracted position, a volume is defined between the piston and the valve member for receiving infusion medium through the passage in the piston and, upon the piston thereafter being moved toward the forward position, the volume between the piston and the valve member decreases to increase infusion medium pressure within the volume, force the valve member to the open position and discharge infusion medium into the outlet chamber.

27. (Currently Amended) A drive mechanism ~~as recited in claim 1,~~ for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

a piston channel for communication of infusion medium received by the inlet;

a coil surrounding the piston channel;

a piston located within the piston channel and moveable axially within the piston channel to drive infusion medium into the piston channel; and

an armature disposed adjacent the coil, on one side of the piston channel,

wherein a clearance between the piston and the piston channel causes a volume of the infusion medium for refilling the piston channel to be greater than a volume of the infusion medium backflowing through the piston channel;

wherein the coil is capable of being electrically activated to provide an electromagnetic field;

wherein the armature is moveable toward the coil, in response to the electromagnetic field produced by an activation of the coil; and

wherein the armature comprises radial struts for conducting electromagnetic flux in a radial direction.

28. (Currently Amended) A drive mechanism ~~as recited in claim 2,~~ for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

a piston channel for communication of infusion medium received by the inlet;

a coil surrounding the piston channel;

a piston located within the piston channel and moveable axially within the piston channel to drive infusion medium into the piston channel; and

an armature disposed adjacent the coil, on one side of the piston channel,

wherein a clearance between the piston and the piston channel causes a volume of the infusion medium for refilling the piston channel to be greater than a volume of the infusion medium backflowing through the piston channel;

wherein the armature has an annular inner pole surface and an annular outer pole surface, each made of a magnetizable material, wherein the inner pole surface of the armature faces the inner pole surface of the inner coil cup wall, and outer pole surface of the armature faces the outer pole surface of the outer coil cup wall.

29. (Original) A drive mechanism as recited in claim 28, wherein the armature further has a plurality of radial struts made of magnetizable material coupling the inner and outer pole surfaces of the armature.

30. (Original) A drive mechanism as recited in claim 29, wherein the armature further has apertures between the radial struts.

31. (Original) A drive mechanism as recited in claim 28, wherein at least one of the inner and outer pole surfaces of the armature are textured.

32. (Original) A drive mechanism as recited in claim 28, wherein the inner pole surface of the armature is spaced from the inner cup wall by a first gap and the outer pole surface is spaced from the outer cup wall by a second gap when the coil is not electrically activated, and wherein the second gap is larger than the first gap.

33. (Currently Amended) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

at least one coil capable of being electrically activated to provide an electromagnetic field, the at least one coil surrounding an axial piston channel that provides a passage for communication of infusion medium received by the inlet;

an armature disposed adjacent the coil, on one side of the axial piston channel and moveable in a first direction relative to the coil, in response to the electromagnetic field produced by an activation of the coil, the armature having a pair of pole surfaces and also having radial struts for conducting electromagnetic flux between the pole surfaces in a radial direction; and

a piston located within the piston channel and moveable axially within the channel in the first direction, in response to movement of the armature,

wherein a clearance between the piston and the piston channel causes a volume of infusion medium for refilling the piston channel to be greater than a volume of infusion medium backflowing through the piston channel.

34. (Currently Amended) An infusion device for delivering infusion medium, the device comprising:

a housing having an outlet through which infusion medium may be discharged;

a reservoir disposed within the housing, for containing a volume of infusion medium;

a control circuit for providing drive control signals;

a drive mechanism disposed within the housing, for driving infusion medium from the reservoir and out the outlet, in response to drive control signals from the control circuit; and

a power source disposed within the housing, for providing power to the control circuit and drive mechanism;

wherein the drive mechanism comprises:

an inlet for receiving infusion medium from the reservoir;

at least one coil capable of being electrically activated to provide an electromagnetic field in response to a signal from the control circuit, the at least one coil surrounding an axial piston channel that provides a passage for communication of infusion medium received by the inlet;

an armature disposed adjacent the coil, on one side of the axial channel and moveable in a first direction relative to the coil, in response to the electromagnetic field produced by an activation of the coil, the armature having a pair of pole surfaces and also having radial struts for conducting electromagnetic flux between the pole surfaces in a radial direction; and

a piston located within the piston channel of the coil and moveable axially within the channel in the first direction, in response to movement of the armature,

wherein a clearance between the piston and the piston channel causes a volume of infusion medium for refilling the piston channel to be greater than a volume of infusion medium backflowing through the piston channel.

35. (Withdrawn) A method or delivery of infusion medium comprising:

providing at least one coil surrounding a piston channel;

providing a piston through the piston channel;

providing an armature on one side of the coil, transverse to the piston;

receiving infusion medium through an inlet disposed on the armature side of a coil;

urging the piston and armature toward a retracted position to form a piston chamber between one end of the piston and a valve member;

filling the piston chamber with infusion medium by passing a volume of the infusion medium received on the armature side of the coil from the inlet through the piston channel to the piston chamber;

electrically activating the coil to provide an electromagnetic field to move the armature and piston toward a forward position,

moving the piston toward the forward position under the force of the electromagnetic field to compress the volume of the piston chamber and force the valve to an open position;

discharging infusion medium from the piston chamber, through the open valve and into an outlet chamber, upon the piston being moved to the forward position; and

delivering the infusion medium discharged from the outlet chamber through an outlet port.

36. (Withdrawn) A drive mechanism for delivery of infusion medium comprising:

at least one coil surrounding a piston channel, the piston channel having an inlet end and an outlet end for communication of infusion medium from the inlet end and out through the outlet end;

a magnetic return path structure surrounding the piston channel and providing a portion of at least one magnetic return path for said at least on coil;

a piston located within the piston channel and moveable axially within the piston channel in response to the energization of said at least one coil;

an armature disposed adjacent the coil, on one side of the piston channel, to provide a further portion of said at least one magnetic flux path; and

an outlet in flow communication with the outlet end of the piston channel, for discharging infusion medium from the piston channel.

37. (Withdrawn) A drive mechanism as recited in claim 36, further comprising an inlet for receiving infusion medium, the inlet in fluid flow communication with the inlet end of the piston channel.

38. (Withdrawn) A drive mechanism as recited in claim 36, wherein said at least one coil surrounding the piston channel comprises a plurality of coils disposed in discrete locations spaced from each other and from the piston channel, said discrete locations surrounding the piston channel.

39. (Withdrawn) A drive mechanism as recited in claim 36, wherein said at least one coil comprises a coil having windings which surround the piston channel.

40. (Withdrawn) A drive mechanism as recited in claim 39, wherein said magnetic return path structure comprises a coil cup composed of a magnetizable material, the coil cup having:

a generally annular inner wall;

a generally annular outer wall;

a generally annular interior between the inner and outer walls, the annular interior containing the coil; and

a central channel surrounded by the inner wall, the central channel of the coil cup being substantially coaxial with the coil;

wherein the inner wall has one end defining an inner pole surface and the outer wall has a second end defining an outer pole surface, the inner and outer pole surfaces acting with the armature to provide an electromagnetic flux path upon electrical activation of the coil.

41. (Withdrawn) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

an outlet for discharging infusion medium;

a piston channel through which infusion medium is communicated between the inlet and the outlet;

a piston located within the piston channel and moveable axially within the piston channel between a retracted position and a forward position, the piston defining a piston chamber at one end of the piston, the piston chamber having a first volume for containing infusion medium received by the inlet when the piston is in the retracted position, wherein the piston chamber volume reduces as the piston is moved from its quiesent position toward its forward position, to drive infusion medium from the piston chamber toward the outlet;

an armature located on one side of the piston channel and moveable between an retracted position and a forward position;

a coil located in a position relative to the armature to generate an electromagnetic field upon energization sufficient to cause the armature and piston to move from their quiesent positions to their forward postions; and

an adjuster for allowing adjustment of the first piston chamber volume.

42. (Withdrawn) A drive mechanism as recited in claim 41, further including a valve member located on the opposite end of the piston channel relative to the armature, wherein the piston chamber is located between the piston and the valve member and wherein said adjuster adjusts a spacing between the piston and the valve member when the piston is in its retracted position.

43. (Withdrawn) A drive mechanism as recited in claim 41, wherein the adjuster comprises a threaded plunger located adjacent one end of the piston.

44. (Withdrawn) A drive mechanism as recited in claim 43, further comprising a flexible diaphragm seal disposed between the plunger and the armature and piston.

45. (Withdrawn) A drive mechansism as recited in claim 41, further comprising a cover member having a threaded aperture and wherein the adjuster comprises a threaded plunger threadingly engaged to the threaded aperture, the plunger extending through the aperture and having an internal end extending within the cover toward the armature and piston and an external end exposed external to the cover for receiving an externally applied rotational force to adjust the amount that the internal end extends within the cover.

46. (Withdrawn) A drive mechanism as recited in claim 41, further comprising means for urging the piston and armature toward the retracted position.

47. (Withdrawn) A drive mechanism as recited in claim 46, wherein said urging means comprises a spring.

48. (Withdrawn) A drive mechanism as recited in claim 46, wherein said urging means comprises a magnet.

49. (Withdrawn) A drive mechanism as recited in claim 41, wherein the coil surrounds the piston channel and piston.

50. (Withdrawn) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

an outlet for discharging infusion medium;

a piston channel through which infusion medium is communicated between the inlet and the outlet;

a piston located within the piston channel and defining a clearance between the piston and the piston channel in fluid flow communication with the inlet for receiving infusion medium from the inlet, the piston being moveable axially within the piston channel between an retracted position and a forward position, the piston defining a piston chamber at one end of the piston when the piston is in the retracted position, the piston chamber being in fluid flow communication with the clearance between the piston and piston channel for receiving infusion medium, wherein the piston chamber volume reduces as the piston is moved from its quiesent position toward its forward position, to drive infusion medium from the piston chamber toward the outlet;

an armature located on one side of the piston channel and moveable between an retracted position and a forward position; and

a coil located in a position relative to the armature to generate an electromagnetic field upon energization sufficient to cause the armature and piston to move from their quiesent positions to their forward positions;

wherein the clearance between the piston and the piston channel is sufficient to convey infusion medium to fill the piston chamber between coil activations.

51. (Withdrawn) A drive mechanism as recited in claim 50, wherein the radial clearance between the piston and the piston channel is within the range of about .003 and .01 of the diameter of the piston.

52. (Withdrawn) A drive mechanism as recited in claim 50, further comprising means for urging the piston and armature to return the piston and armature to their retracted positions upon deactivation of the coil and wherein the clearance between the piston and the piston channel is sufficient to convey infusion medium to fill the piston chamber as the piston returns from the forward postion to the quiesent position.

53. (Withdrawn) A drive mechanism as recited in claim 52, wherein said urging means comprises a spring.

54. (Withdrawn) A drive mechanism as recited in claim 52, wherein said urging means comprises a magnet.

55. (Withdrawn) A drive mechanism as recited in claim 50, wherein the coil surrounds the piston channel and piston.

56. (Withdrawn) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

an outlet for discharging infusion medium;

a piston channel through which infusion medium is communicated between the inlet and the outlet;

a piston located within the piston channel to define a fluid flow path between the inlet and outlet, the piston being moveable axially within the piston channel between an retracted position and a forward position to drive infusion medium toward the outlet,

an armature located on one side of the piston channel and moveable between an retracted position and a forward position;

a coil located in a position relative to the armature to generate an electromagnetic field upon energization sufficient to cause the armature and piston to move from their quiesent positions to their forward postions; and

a magnet arranged relative to at least one of the armature and the piston to impart a force on at least one of the armature and the piston sufficient to move at least one of the armature and the piston from the forward position to the retracted position upon deenergization of the coil.

57. (Withdrawn) A drive mechanism as recited in claim 56, wherein the piston and armature are connected together and move between quiesent and forward positions as a unitary structure.

58. (Withdrawn) A drive mechanism as recited in claim 56, wherein the piston and armature are separate elements capable of movement independent from each other.

59. (Withdrawn) A drive mechanism as recited in claim 58, wherein the fluid flow path in the piston channel comprises a clearance between the piston and the piston channel.

60. (Withdrawn) A drive mechanism as recited in claim 58, wherein the fluid flow path in the piston channel comprises an internal channel provided through the piston, in the axial direction of the piston.

61. (Withdrawn) A drive mechanism as recited in claim 58, wherein the coil surrounds the piston channel and piston.

62. (Withdrawn) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

an outlet for discharging infusion medium;

a piston channel through which infusion medium is communicated between the inlet and the outlet;

a piston located within the piston channel to define a fluid flow path between the inlet and outlet, the piston being moveable axially within the piston channel between an retracted position and a forward position to drive infusion medium toward the outlet,

an armature located on one side of the piston channel and moveable between an retracted position and a forward position;

a coil located in a position relative to the armature to generate an electromagnetic field upon energization sufficient to cause the armature and piston to move from their quiesent positions to their forward postions; and

a valve assembly module having a valve member moveable between open and closed positions to selectively open and close one end of the piston channel to the outlet chamber, the valve member being moveable in response to axial movement of the piston within the piston channel.

63. (Withdrawn) A drive mechanism as recited in claim 62, wherein the valve assembly comprises a valve cap containing the valve member and a valve spring supporting the valve member for movement within the valve cap.

64. (Withdrawn) A drive mechanism as recited in claim 63, further comprising a housing containing the piston chamber, the housing having an aperture for receiving the valve assembly.

65. (Withdrawn) A drive mechanism as recited in claim 63, further comprising a housing containing the piston chamber, the housing having a threaded aperture, wherein the valve cap includes a threaded surface matching the threads of the housing aperture, for threadingly connecting the valve assembly to the threaded aperture of the housing.

66. (Withdrawn) A drive mechanism as recited in claim 62, further comprising means for urging the piston and armature to return the piston and armature to their retracted positions upon deactivation of the coil.

67. (Withdrawn) A drive mechanism as recited in claim 66, wherein said urging means comprises at least one of a spring and a magnet.

68. (Withdrawn) A drive mechanism as recited in claim 62, wherein the coil surrounds the piston channel and piston.

69. (Previously Presented) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

a piston channel for communication of infusion medium received by the inlet;

a coil surrounding the piston channel;

a piston located within the piston channel and moveable axially within the piston channel to drive infusion medium into the piston channel;

an armature disposed adjacent the coil, on one side of the piston channel;

an outlet chamber disposed adjacent the coil, on the opposite side of the piston channel relative to the armature for receiving infusion medium from the channel; and

an outlet in flow communication with the outlet chamber, for discharging infusion medium from the outlet chamber,

wherein the coil is capable of being electrically activated to provide an electromagnetic field;

wherein the armature is moveable toward the coil, in response to the electromagnetic field produced by an activation of the coil; and

wherein the armature comprises radial struts for conducting electromagnetic flux in a radial direction.

70. (Previously Presented) A drive mechanism for delivery of infusion medium comprising:

an inlet for receiving infusion medium;

a piston channel for communication of infusion medium received by the inlet;

a coil surrounding the piston channel;

a piston located within the piston channel and moveable axially within the piston channel to drive infusion medium into the piston channel;

a coil cup containing the coil, the coil cup having an inner pole surface and an outer pole surface;

an armature disposed adjacent the coil, on one side of the piston channel;

an outlet chamber disposed adjacent the coil, on the opposite side of the piston channel relative to the armature for receiving infusion medium from the channel; and

an outlet in flow communication with the outlet chamber, for discharging infusion medium from the outlet chamber,

wherein the armature has an annular inner pole surface and an annular outer pole surface, each made of a magnetizable material, and

wherein the inner pole surface of the armature faces the inner pole surface of the coil cup, and the outer pole surface of the armature faces the outer pole surface of the coil cup.

71. (Previously Presented) The drive mechanism of Claim 1, wherein the volume of the infusion medium for refilling the piston channel is about 1 to 4 times greater than the volume of the infusion medium backflowing through the piston channel.

72. (Previously Presented) The drive mechanism of Claim 1, wherein a ratio of a diameter of the piston to a diameter of the piston channel is within a range of about 0.990 to about 0.995.

73. (Previously Presented) The drive mechanism of Claim 1, wherein the clearance between the piston and the piston channel averages about 250 microinches.

74. (Previously Presented) The drive mechanism of Claim 1, further comprising:

a valve member being moveable in response to axial movement of the piston within the piston channel,

wherein a clearance between the piston and the piston channel is sufficient to restrict the infusion medium within the piston channel such that pressure on the infusion medium caused by movement of the piston opens the valve member.

75. (Previously Presented) The drive mechanism of Claim 1, further comprising:

an outlet chamber disposed adjacent the coil, on the opposite side of the piston channel relative to the armature for receiving infusion medium from the channel; and

an outlet in flow communication with the outlet chamber, for discharging infusion medium from the outlet chamber.

76. (Previously Presented) The drive mechanism of Claim 33, further comprising:

an outlet chamber disposed adjacent the coil, on the opposite side of the piston channel relative to the armature for receiving infusion medium from the piston channel, upon movement of the piston in the first direction; and

an outlet in flow communication with the outlet chamber, for discharging infusion medium from the outlet chamber.

77. (Previously Presented) The infusion device of Claim 34, wherein the drive mechanism further comprises:

an outlet chamber disposed adjacent the coil, on the opposite side of the piston channel relative to the armature for receiving infusion medium from the piston channel, upon movement of the piston in the first direction; and

an outlet port in flow communication with the outlet chamber and the housing outlet, for discharging medium from the outlet chamber, through the housing outlet.